

IN THE CLAIMS:

1. (Currently Amended) An optical transmission system in which an electrical signal is converted to an optical signal and is transmitted from an optical transmitter to an optical receiver and outputted in a form of [[an]] the output electrical signal ~~after a noise canceling process is performed, the noise canceling process canceling out noise components which occur during the transmission,~~ wherein

the optical receiver and the optical transmitter are connected to each other by one optical fiber, through which an optical signal is transmitted ~~before being intensity modulated,~~

the optical receiver includes:

- a first processing unit operable to receive an optical signal, ~~intensity modulate~~
10 convert a frequency of an electrical signal in the received optical signal by using intensity modulation, and split the ~~intensity-modulated~~ optical signal into two optical signals of which respective intensity-modulated components that each have the converted frequency are in antiphase;

first and second optical transmission lines fibers which transmit the two optical
15 signals respectively; and

a second processing unit operable to convert the two optical signals into electrical signals respectively, and generate an output electrical signal by performing differential amplification on the electrical signals.

2. (Currently Amended) The optical transmission system of Claim 1, wherein

the optical transmitter includes an output processing unit operable to receive [[an]] the electrical signal, convert the electrical signal into an optical signal, and transmit the optical signal to the optical receiver via the optical fiber.

3. (Currently Amended) The optical transmission system of Claim 2, wherein
the first processing unit includes:

an intensity modulation subunit operable to receive an optical signal via the
optical fiber, intensity-modulate the received optical signal based on a modulated electrical
5 signal having a certain frequency, and thereby generate a modulated optical signal; and

an optical separation subunit operable to generate, from the modulated optical
signal, a first output optical signal and a second output optical signal of which respective
intensity-modulated components are in antiphase, and output the first and second output optical
signals to the first and second optical lines fibers respectively, and

- 10 the second processing unit includes:

an optical/electrical conversion subunit operable to convert the first and second
output optical signals into first and second electrical signals respectively; and

a differential amplification subunit operable to invert a phase of the second
electrical signal, add the phase-inverted second electrical signal to the first electrical signal, and
15 thereby generate the output electrical signal.

4. (Original) The optical transmission system of Claim 3, wherein

the first processing unit consists of a Mach-Zehnder type external modulator, and
the second processing unit consists of a balanced optical/electrical converter.

5. (Original) The optical transmission system of Claim 3, wherein

the electrical signal which the output processing unit receives is an intermediate
frequency signal having a frequency which is different from a frequency of a radio frequency
signal,

5 the modulated electrical signal is a local oscillator signal,

the intensity modulation subunit intensity-modulates the received optical signal based on a frequency of the local oscillator signal, and thereby generates the modulated optical signal of which intensity-modulated components have a frequency of the radio frequency signal,

the optical/electrical conversion subunit converts the first and second output
10 optical signals into the first and second electrical signals respectively, the first and second electrical signals having the frequency of the radio frequency signal, and

the differential amplification subunit inverts the phase of the second electrical signal, adds the phase-inverted second electrical signal to the first electrical signal, and thereby generates the radio frequency signal.

6. (Currently Amended) The optical transmission system of Claim 2, wherein
the output processing unit includes:

a generation subunit operable to receive an electrical signal, convert the received electrical signal into an optical signal, and output the optical signal to a third optical transmission
5 line fiber; and

a polarization scrambler operable to receive the optical signal via the third optical transmission line fiber, change a polarization type of the optical signal randomly, and output the optical signal to the optical receiver via the optical fiber.

7. (Original) The optical transmission system of Claim 6, wherein
the first processing unit receives an optical signal of which a polarization type changes randomly from the optical transmitter via the optical fiber.

8. - 12. (Cancelled)

13. (Currently Amended) An optical transmission method that is used for an optical transmission system in which an electrical signal is converted to an optical signal and is

transmitted from an optical transmitter to an optical receiver and outputted in a form of [[an]] the output electrical signal ~~after a noise canceling process is performed, the noise canceling process~~ 5 ~~cancelling out noise components which occur during the transmission,~~ wherein

the optical receiver and the optical transmitter are connected to each other by one optical fiber, through which an optical signal is transmitted ~~before being intensity-modulated,~~

the optical receiver performs:

a first processing step of receiving an optical signal, ~~intensity-modulating~~ 10 converting a frequency of an electrical signal in the received optical signal by using intensity modulation, and splitting the ~~intensity-modulated~~ optical signal into two optical signals of which respective intensity-modulated components that each have the converted frequency are in antiphase;

a transmission step of transmitting the two optical signals with use of first and 15 second optical transmission lines fibers respectively; and

a second processing step of converting the two optical signals into electrical signals respectively, and generating an output electrical signal by performing differential amplification on the electrical signals.

14. (Currently Amended) The optical transmission method of Claim 13, wherein the optical transmitter performs an output processing step of receiving [[an]] the electrical signal, converting the electrical signal into an optical signal, and transmitting the optical signal to the optical receiver via the optical fiber.

15. (Currently Amended) The optical transmission method of Claim 14, wherein the first processing step performs:

an intensity modulation step of receiving an optical signal via the optical fiber,
intensity-modulating the received optical signal based on a modulated electrical signal having a
5 certain frequency, and thereby generating a modulated optical signal; and

an optical separation step of generating, from the modulated optical signal, a first
output optical signal and a second output optical signal of which respective intensity-modulated
components are in antiphase, and outputting the first and second output optical signals to the first
and second optical lines fibers respectively, and

10 the second processing step performs:

an optical/electrical conversion step of converting the first and second output
optical signals into first and second electrical signals respectively; and

a differential amplification step of inverting a phase of the second electrical
signal, adding the phase-inverted second electrical signal to the first electrical signal, and thereby
15 generating the output electrical signal.

16. (Previously Presented) The optical transmission method of Claim 15, wherein
the first processing step is performed in a Mach-Zehnder type external modulator,

and

the second processing step is performed in a balanced optical/electrical converter.

17. (Previously Presented) The optical transmission method of Claim 15, wherein
the electrical signal processed in the output processing step is an intermediate
frequency signal having a frequency which is different from a frequency of a radio frequency
signal,

5 the modulated electrical signal is a local oscillator signal,

the intensity modulation step intensity-modulates the received optical signal based on a frequency of the local oscillator signal, and thereby generates the modulated optical signal of which intensity-modulated components have a frequency of the radio frequency signal,

10 the optical/electrical conversion step converts the first and second output optical signals into the first and second electrical signals respectively, the first and second electrical signals having the frequency of the radio frequency signal, and

the differential amplification step inverts the phase of the second electrical signal, adds the phase-inverted second electrical signal to the first electrical signal, and thereby generates the radio frequency signal.

18. (Currently Amended) The optical transmission method of Claim 14, wherein

the output processing step performs:

5 a generation step of receiving an electrical signal, converting the received electrical signal into an optical signal, and outputting the optical signal to a third optical transmission line fiber; and

a polarization scramble step of receiving the optical signal via the third optical transmission line fiber, changing a polarization type of the optical signal randomly, and outputting the optical signal to the optical receiver via the optical fiber.

19. (Previously Presented) The optical transmission method of Claim 18, wherein

the first processing step receives an optical signal of which a polarization type changes randomly from the optical transmitter via the optical fiber.

20. - 24. (Cancelled)